Comparing Spring 2020 with Jiawei

- Jiawei has 1123 nudge events, while I have 1241 nudge events, over the total run period
- Initial discrepancy partly due to:
  - I was dropping events where beam is down (343 events with initial current <10 nA)
  - I was not filtering out bad runs with @is_dirc_production and @status_approved tags
  - Jiawei also included my requirement that 10 seconds have elapsed since goniometer changes

Coordinates of Coherent Bremsstrahlung

$$c \simeq \frac{k}{gE_0^2[\frac{1}{E} - \frac{1}{E_0}]}$$

where:

$g = \pm 2, \pm 4, \pm 6$ ....

E = required position of coherent edge (MeV)

E_0 = electron beam energy (MeV)

$k = m_e a/4\sqrt{2}\pi = 26.5601$ MeV

m_e = mass of electron = 0.511 MeV

a = diamond lattice constant = 923.7 (dimensionless units)

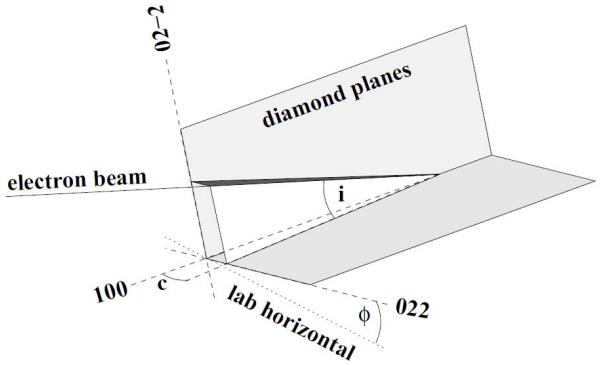

Figure 2. Illustration of the scattering angles for coherent bremsstrahlung from a diamond in the 100 orientation. The sets of planes defined by the [022] and [02$\bar{2}$] lattice vectors are represented by 2 single orthogonal planes.

K. Livingston, The Stonehenge technique. A method for aligning coherent bremsstrahlung radiators, *Nucl. Instrum. Meth. A* 603 (3) (2009) 205-213.

Can we map the angles in Livingston's model to the angles under our control (i.e. pitch, yaw, roll)?

Mapping between c and pitch/yaw changes from moveCbrem.sh

```
if((perp_mode==1)||(perp_mode==4)){
  v = + c*sinphi; h = - c*cosphi;
}
else{
  v = - c*sinphi; h = + c*cosphi;
}
```

```
  if((para_mode==2)||(para_mode==3)){
    v = + c*cosphi; h = + c*sinphi;
  }
  else{
    v = - c*cosphi; h = - c*sinphi;
  }
```

v = the change in yaw

h = the change in pitch